



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Solution by P. H. PHILBRICK, C. E., Lake Charles, La.

The number of board feet in a log d inches in diameter and l inches in length is $n = \frac{\frac{1}{4}\pi d^2 l}{144}$.

$$\text{If } l \text{ is in feet, } n = \frac{\frac{1}{4}\pi d^2 l}{12}.$$

Substituting $\frac{22}{7}$ for π and 10 for l we have, $n = \frac{5}{8} \cdot \frac{11}{14} d^2$.

$$\text{Allowing } \frac{1}{8} \text{ for saw cut, } n = \frac{4}{5} \cdot \frac{5}{8} \cdot \frac{11}{14} d^2 = \frac{11}{21} d^2.$$

$$\text{Allowing } \frac{1}{2} \text{ inch for bark, } n = \frac{11}{21} (d-1)^2.$$

$$\text{For } d=22, \text{ an average value, } (d-1)^2 = \frac{441}{400} (d^2 - 2d).$$

$$\therefore n = \frac{11}{21} \cdot \frac{441}{400} (d^2 - 2d) = \frac{21}{40} (d^2 - 2d).$$

I would propose the formula $n = d^2$ (or $n = (d-1)^2$) for a log 20 feet long, since it is as accurate and much more simple than Wentworth's.

The most accurate formula, however, must be based on the end diameters of the log.

Let d and D represent those diameters.

Board feet in total volume of log 20 feet long

$$= \frac{1}{4}\pi \cdot \frac{5}{3} \times \frac{d^2 + dD + D^2}{3} = \frac{5}{8} \times \frac{11}{14} (d^2 + dD + D^2).$$

(See Philbrick's *Engineer's Manual*, table 23).

Since $(D-d)^2 = D^2 - 2dD + d^2 > 0$, $D^2 + dD + d^2 > 3dD$.

Hence volume $> \frac{5}{8} \times \frac{11}{14} dD$.

Allowing $\frac{1}{8}$ for saw cut, $n > \frac{5}{8} \times \frac{11}{14} dD = \frac{55}{112} dD$.

Allowing $\frac{1}{2}$ of the above for bark we still have $n > dD$, or, say, $n = dD \dots (1)$.

It is easily shown that volume $> \frac{5}{8} \times \frac{11}{14} \left[\frac{d+D}{2} \right]^2$

and as before that $n = \left[\frac{d+D}{2} \right]^2 \dots (2)$.

The author's experience leads him to believe that the above formulas are quite accurate, but that logs will cut a little more into large timbers than the formulas give.

If thought to give too large a result, in extreme cases, we might suggest the formula, $n = d(D-2) \dots (3)$, or $n = \left[\frac{d+D}{2} - 1 \right]^2 \dots (4)$.

At all events the forms suggested should be used.

ALGEBRA.

111. Proposed by ARTEMAS MARTIN, A. M., Ph. D., LL.D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

Solve the equation $x(y+z) = a(x+y+z)$, $y(x+z) = b(x+y+z)$, $z(x+y) = c(x+y+z)$.

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa., and HON. JOSIAH H. DRUMMOND, LL. D., Portland, Me.

Let $x+y+z=s$. Then (1)+(2)+(3) gives $xy+xz+yz=\frac{1}{2}(a+b+c)s \dots (4)$.

(4) - (1) gives $yz=\frac{1}{2}(b+c-a)s \dots (5)$.

(4) - (2) gives $xz=\frac{1}{2}(a+c-b)s \dots (6)$.

(4) - (3) gives $xy=\frac{1}{2}(a+b-c)s \dots (7)$.

(6) ÷ (7) gives $z/y=(a+c-b)/(a+b-c) \dots (8)$.

$$(8) \text{ multiplied by (5) gives } z = \sqrt{\frac{(a+c-b)(b+c-a)s}{2(a+b-c)}} \dots (9)$$

$$\text{Similarly, } y = \sqrt{\frac{(a+b-c)(b+c-a)s}{2(a+c-b)}} \text{, } x = \sqrt{\frac{(a+b-c)(a+c-b)s}{2(b+c-a)}} \dots (10, 11)$$

$$(9)+(10)+(11) \text{ gives } \sqrt{s} = \frac{2ab+2ac+2bc-a^2-b^2-c^2}{\sqrt{[2(a+b-c)(a+c-b)(b+c-a)]}} \dots (12)$$

(12) in (9), (10), (11) gives

$$x(b+c-a)=y(a+c-b)=z(a+b-z)=\frac{1}{2}(2ab+2ac+2bc-a^2-b^2-c^2)$$

Also solved by J. M. BOORMAN, W. H. CARTER, C. C. CROSS, LESLIE L. LOCKE, COOPER D. SCHMITT, ELMER SCHUYLER, J. SCHEFFER, B. F. YANNEY, J. W. YOUNG, and M. A. GRUBER.

GEOMETRY.

138. Proposed by JOHN M. HOWIE, Professor of Mathematics, The Nebraska State Normal, Peru, Neb.

K is the middle point of any chord AB of a given circle. CD and EF are any two chords passing through K . CF and ED intersect AB at M and N , respectively. Prove that KM equals KN .

I. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.; P. S. BERG, B. Sc., Larimore, N. D.; and F. B. FILLMAN, Chester, Pa.

CASE I. N and M within the circle.

$$\triangle DKN / \triangle CKM = DK \cdot NK / CK \cdot MK \dots (1)$$

$$\triangle EKN / \triangle FKM = EK \cdot NK / FK \cdot MK \dots (2)$$

$$\triangle CKM / \triangle EKN = CM \cdot CK / EN \cdot EK \dots (3)$$

Multiplying (1) by (3),

$$\frac{\triangle DKN}{\triangle EKN} = \frac{DK \cdot NK \cdot CM}{MK \cdot EN \cdot EK} = \frac{DN}{EN} \dots (4)$$

Multiplying (2) by (3),

$$\frac{\triangle CKM}{\triangle FKM} = \frac{NK \cdot CM \cdot CK}{EN \cdot FK \cdot MK} = \frac{CM}{FM} \dots (5)$$